NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

PRESCRIBED BURNING

(Acre)

CODE 338

I. SCOPE

The work shall consist of providing all necessary materials, labor, and equipment to apply fire to a predetermined area (as shown on the conservation plan map) under conditions where the intensity and spread of fire are controlled.

II. GENERAL

Only trained and well-qualified NRCS personnel are authorized to provide assistance in planning and implementing prescribed burns. The extent to which an NRCS employee may provide technical assistance in planning and implementing prescribed burns will be restricted by the level of job approval authority which has been attained.

Each identifiable prescribed burn treatment area requires a separate burn plan. The prescribed burn plan will follow policy and guidance provided in the PRESCRIBED BURNING conservation practice standards and specifications.

All permits necessary to carryout the prescribed burn will be obtained.

Burn plans must adhere to all federal, state and local laws regarding outdoor burning, fire control, smoke management, and air quality. Prescribed burn plans will be coordinated and cleared through such groups as rural fire departments; adjacent landowners; county commissioners; local law enforcement offices and Nevada Highway Patrol; Nevada Division of Forestry; Nevada Division of Wildlife; US Forest Service, and the Bureau of Land Management, as applicable.

NRCS personnel assisting with prescribed burning practice application are to document in the conservation plan file that the landowner has been informed that he/she is responsible for adherence to local, state, and federal laws and regulations pertaining to the use and management of fire and that he/she may be liable for damages and costs for fire suppression by others, should prescribed fire escape from a designated area.

All areas to be treated will have form SCS-CPA-52 "Environmental Effects for Conservation Plans and Areawide Conservation Plans" completed prior to practice application.

Areas to be treated will have form NV-ECS-01 (Rev. 4/88) "Rangeland Inventory Worksheet" completed prior to practice application. The header entries on form NV-ECS-01 are to be filled-in and columns 3, 5, 6, and 7 will be completed for commonly occurring species in the pretreatment plant community. Column 4 on form NV-ECS-01 (canopy cover) is also to be completed for each tree or shrub species in the pretreatment plant community.

III. TYPES OF PRESCRIBED BURNS

Rotation Burning. Rotational burning is a strategy where portions of an area are burned in a predetermined sequence to remove competing woody plants and allow natural revegetation to occur following treatment. Treatment sites are re-burned at designated time intervals, e.g. every 20 years in mountain big sagebrush management.

Rotation of prescribed burns should be scheduled within a twenty to thirty year rotation cycle – twenty-five percent of the watershed vegetation should be in less than a seven year old age class.

Localized heavy grazing may become a problem when only small portions of a grazing unit have been burned. Type-conversion burns, where an entire pasture is burned uniformly, are usually a preferable treatment on areas managed primarily for livestock grazing. When all of a pasture can not be burned concurrently, grazing management will be based on the needs of the burned area.

Wildlife escape cover (waist-high brush, usually more than 7 years old) should connect recent burns (1-3 years old).

Small burns, scattered throughout a dense stand of brush, provide better wildlife habitat than an initial clearing continuously enlarged with subsequent perimeter burns.

On steep slopes, burn the upper part of the slope the first year and lower part of the slope in later stages of the rotation cycle.

For rotational burns, specify the return interval for re-treatment and percent (amount) of area to be burned relative to total area in management unit.

III. TYPES OF PRESCRIBED BURNS (continued)

Type-conversion. Type-conversion burns are intended to convert stands of undesirable woody vegetation to another, more desirable, vegetation type.

Grazing may need to be deferred for one or more growing seasons preceding the burn to maximize fuel to carry the fire

Type-conversion burns are most effective on plant species that are not fire tolerant, or do not sprout from roots or crowns following fire.

For type-conversion burns, specify all additional treatments (conservation practice application) required following removal of existing vegetation.

Fuel Reduction. Fuel reduction burns are commonly used to reduce the volume of dead, highly flammable fuels; to thin dense thickets of tree saplings and pole-size stands; create a mineral seedbed in forest openings for germination of new seeds; raise lower crown level of trees; keep shade tolerant trees out of the forest understory and remove shrubs and debris that can form vegetation ladders to carry surface fires into the crowns of larger trees.

For fuel reduction burns, specify all additional treatments (conservation practice application) required following treatment.

IV. PLANNING PRESCRIBED BURNS

Reference to Table I, *Expected Effects of Fire on Selected Plant Species*, in planning prescribed burns to meet landowner objectives.

Natural fire barriers should be incorporated into the burn plan where feasible. Install needed fire breaks (blacklines and disked or graded strips) prior to burning.

Dimensions of firelines and blacklines will be designed for each burn and recorded in the prescribed burn plan.

Constructed fire lines (graded, dozed, bladed, or disked) will be a minimum of ten (10) feet wide.

For constructed fire lines, cleared rolls of soil and vegetative material are to be piled on the side of the fireline opposite the burn.

Pre-burned strips (blacklines) on the downwind side of designated burn areas shall be at least 100 feet wide for low volatile fuels (e.g. herbaceous and green woody plants) and at least 500 feet wide for highly volatile fuels (e.g. dead juniper and pinyon trees). Pre-burn or remove any brush piles or highly flammable materials within the area to be burned.

Follow manufacturer's product label when using a commercial fire retardant.

Ensure that fire-fighting equipment will have access to the full perimeter of burn area at all times during burn.

V. CRITERIA FOR BURNING

Areas exceeding 30 percent slope, and areas of highly erosive, or unstable, soils should not be recommended for prescribed burning. On-site investigations will be made where published soils information is not available.

Conditions specified for initiating prescription burns are not to exceed acceptable range(s) listed in the burn plan. If fire weather conditions exceed prescribed limits, all ignition will stop.

SAGEBRUSH-GRASS COMMUNITIES

Late Summer or Fall Burn (August - October)

- Canopy cover of sagebrush should be at least 20 percent with 600 to 700 pounds per acre of fine fuel ground cover
- Burn after cool-season perennial grasses have become dormant
- Delay burning for at least 10 days following desirable perennial grass species seed ripening and dissemination
- Soil moisture is usually not critical
- Late summer and fall burning is least detrimental to cool season perennial forbs and bunch grasses
- Do not burn if green-up of perennial herbaceous plants has occurred with early fall rainfall
- Start burn late enough in the day so that if fire does escape, little time will remain before air temperatures drop, humidity rises, wind speed slows or changes direction, and fires burn less briskly

Early Spring Burn (January - April)

- Burn in late winter (January or February thaw period) or very early spring as snow recedes and plants are still dormant, or just after they break dormancy.
- Less than two (2) inches of new growth on desirable grasses - best if perennial herbaceous plants have not initiated spring green up
- Soils must be damp 12 to 18 inches below surface
- Spring is period perennial forbs are most susceptible to damage from burning
- Often a high level of uncertainty in vegetation response to burning as by the time fine fuels of previous year's growth dry sufficiently to burn, perennial herbaceous plants have broken dormancy and initiated new growth
- Late summer and fall burning is more common for the northern Great Basin

V. CRITERIA FOR BURNING (continued)

PINYON and/or JUNIPER COMMUNITIES

In open stands of pinyon and juniper (less than 10 percent tree cover) mixed with brush and grass, prescribed burns are effective in removing only those trees less than about four (4) feet tall. At least 600 to 700 pounds per acre of fine fuel ground cover is needed to carry a fire in these open stands. Mature trees in open stands of pinyon and juniper are eliminated by chaining, dozing or hand-cutting followed by burning of the site to retard encroachment of young trees (seedlings and saplings).

Closed stands of pinyon and juniper (greater than 35 percent tree canopy cover) are very difficult to burn as fire does not carry easily.

Stands of mature pinyon and juniper with tree canopy cover ranging from 10 to 35 percent can be burned on hot, windy days if properly prepared.

Bruner and Klebenow (1979) demonstrated that success of a burn in mature pinyon and juniper stands (10 to 35 percent tree cover) can be predicted by adding together the maximum wind speed in miles per hour, the air temperature in degrees Fahrenheit, and the percentage of vegetation cover: (wind speed [mph] + air temperature [^{o} F] + vegetation cover [%] = Score). If the score obtained is less than 110, the plant community will not burn; if the score obtained is more than 130, conditions are too hazardous to burn. Scores between 110 and 125 produce fires that need to be continually reset. Scores between 126 and 130 produce fires that carry well and result in clean burns.

When burning pinyon or juniper, green moisture should be 70 to 80 percent for effective kill. Less than 70 percent moisture will result in a very hot, and possibly uncontrollable, burn. Foliage moisture greater than 80 percent will not provide desirable control. To determine green moisture, collect several 100 to 200 gram samples of green leaf material from trees in area to be burned and immediately record the weight (green weight). Oven-dry the samples for 16 hours (minimum) to 20 hours (maximum) at 140^{o}F and record weight of (oven-dry) material. Calculate percent moisture using the following formula:

$$\frac{\text{Green Weight} - \text{Oven-dry Weight}}{\text{Oven-dry Weight}} \times 100$$

When burning in slash, ideal wood fuel moisture is 7 to 12 percent. Woody fuels with less than 6 percent moisture are too dry and firebrands and spot fires are possible. Woody fuels having 12 to 13 percent moisture will burn but fire will not spread. Woody material will not burn when fuel moisture is greater than 15 percent. Calibrated (100 gram) wooden dowels are commonly used to measure fuel moisture.

Juniper and pinyon stands that have been converted to herbaceous plants or a mix of herbaceous plants and brush should be re-burned about every 20 to 40 years or when the tallest re-invading juniper or pinyon sapling reaches four (4) feet tall.

VI. PERFORMING PRESCRIBED BURNS

Do not burn when:

- ⇒ air temperature is more than 90^{o}F
- ⇒ wind velocity is more than 20 mph
- ⇒ relative humidity is less than 10 percent

The landowner will notify adjacent landowners and all fire departments, law enforcement agencies, and other authorities specified for notification in burn plan.

Do not burn until all persons involved are informed of the burn plan and their responsibilities during the burn.

Ensure that there is adequate equipment and labor on hand to control the fire at all times.

The fire boss is the sole leader and burn coordinator. The fire boss should be highly mobile and always positioned in a strategic location. The fire boss will continually assess the progress of the burn, make needed adjustments, and keep the burn crew informed of decisions, progress of, burn, changes in weather, etc. during the fire.

Always perform a small “test” fire on a downwind corner of the area to be burned prior to starting actual burn.

Do not burn over ridges as this practice can create fire whirls and add to risk of fire escape. Burn along ridges to prevent fire whirls.

Influence of slopes on fire behavior within burn area must be anticipated. Allow for wind direction changes due to hills and draws. If a headfire is to be directed up a slope (or into draws or swales), width of blackline must be increased.

Headfires should not be burned into a backfire unless the possibility for fire whirls has been considered and effects of potential fire whirls accounted for.

Do not burn areas littered with large, dead and decaying, woody material if the weather forecast predicts strong winds within three (3) days following burn.

Monitor and document fireline conditions continuously. Special caution is required for burning material within 100 feet of fire perimeter.

Continuously monitor fire weather factors. It is important to recall that as air temperature increases, relative humidity decreases. For every 20 °F increase in air temperature, relative humidity will decrease by 50%, and for every 20 °F decrease in air temperature, relative humidity will increase by 100%.

VI. PERFORMING PRESCRIBED BURNS

Wind speed and wind direction should be monitored at 15-minute intervals and air temperature and relative humidity should be monitored at 30-minute intervals if variable weather conditions are anticipated.

Weather stations are not to be located on the upwind or downwind side of a burn.

As weather variables are monitored, if conditions exceed prescribed limits, ***all ignition will stop.***

A prescribed burn should be carried out as fast as it can be safely accomplished.

"Mop-up" the burn prior to leaving treatment site. Maintain close observation of the burned area until the fire is extinguished.

Crowns of shrubs, tree stumps, and dry manure may smolder for several days after burning.

VII. POST-BURN MANAGEMENT

Reference to standards and specifications for RANGE PLANTING (Code 550), PASTURE AND HAYLAND PLANTING (Code 512), WOODLAND DIRECT SEEDING (Code 652), TREE AND SHRUB ESTABLISHMENT (Code 612), and/or USE EXCLUSION (Code 472) for guidance on revegetation of treatment sites following burning.

When range seeding is not required, area will be rested one full growing season. When range seeding is required, area will be rested a minimum of two full growing seasons following planting, or until successful plant community establishment occurs. Exceptions to these specified grazing deferments may be necessary to apply biological control methods.

Refer to Nevada NRCS Plant Materials Technical Note No. 32, *Determining Success of Forage Production Seedings,* for guidance in making evaluations of planting success. Form NV-ECS-11, *Evaluation of Field, Special, or Demonstration Plantings*, may be used to record planting evaluations.

PRESCRIBED GRAZING (Code 528-A) standards and specifications will be followed for treatment areas to be grazed by domestic livestock following burning.

VIII. BASIS OF ACCEPTANCE

A minimum of 85 percent of the designated land area should have been burned as prescribed with objectives for burn being met.

After the burn has been completed, an on-site inspection will be conducted to determine total area treated and the amount of targeted species that have been removed.

Treated areas of rangeland will have form NV-ECS-01 (Rev. 4/88) "Rangeland Inventory Worksheet" completed (including estimates of canopy cover for woody species) as the *minimum* record of the effects of practice application.

REFERENCES

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Brunner, A.D. and Klebenow, D.A. 1979. Predicting Success of Prescribed Fires in Pinyon-Juniper Woodland in Nevada. USDA Forest Service, Intermountain Forest and Range Experiment Station Research Paper INT-219. Ogden, UT.

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Bunting, S.C. et al. 1987. Guidelines for Burning Sagebrush-Grass Rangelands in the Northern Great Basin. USDA Forest Service, Intermountain Forest and Range Experiment Station General Technical Report INT-231. Ogden, UT.

USDA Cooperative Extension Service. 1989. Prescribed Fire in the Intermountain Region. Washington State University, Pullman, WA.

TABLE I. Expected Effects of Fire on Plant Species

TREES

COMMON NAME	SCIENTIFIC NAME	RESPONSE TO FIRE	REMARKS
Rocky Mountain White fir	*Abies concolor var. concolor*	Killed or injured by all but light fires	Pre-burn plant community composition reduced by fire
Subalpine fir	*Abies lasiocarpa*	Killed or injured by all but light fires	Pre-burn plant community composition reduced by fire
Utah juniper	*Juniper osteosperma*	Generally killed - usually requires greater wind speed to carry fire	Pre-burn plant community composition reduced by fire. Mature stands difficult to burn - young trees (<5 ft) easily killed by fire
Western juniper	*Juniper occidentalis*	Generally killed - usually requires greater wind speed to carry fire	Pre-burn plant community composition reduced by fire. Mature stands difficult to burn - young trees (<5 ft) easily killed by fire
Incense cedar	*Libocedrus decurrens*	Old trees resistant - young trees susceptible	
Western white pine	*Pinus monticola*	Killed or injured by all but light fires	Pre-burn plant community composition reduced by fire
Western larch	*Larix occidentalis*	Mature trees very resistant - seedlings susceptible	Can refoliate after crown has been scorched
Rocky Mountain Douglas fir	*Pseudotsuga menziesii var.glauca*	Old trees fairly resistant - young trees susceptible	
Engelmann spruce	*Picea engelmanii*	Susceptible to all but light fires	
Lodgepole pine	*Pius contorta*	Killed or injured by all but light fires	Prolific seedling emergence after fire
Ponderosa pine and Jeffrey pine	*Pinus ponderosa and Pinus jeffreyi*	Most resistant of western trees	Killed by crown damage from intense fires
Sugar pine	*Pinus lambertiana*	Old trees fairly resistant - young trees susceptible	
Quaking aspen	*Populus tremuloides*	Susceptible to all but light fires	Enhanced by fire - vigorous root sprouter following fire
Singleleaf pinyon	*Pius monophylla*	Generally killed - usually requires greater wind speed to carry fire	Pre-burn plant community composition reduced by fire. Mature stands difficult to burn - young trees (<5 ft) easily killed by fire
Western hemlock	*Tsuga heterophylla*	Old trees somewhat resistant - species generally reduced by fire	

TABLE I. Expected Effects of Fire on Plant Species (continued)

SHRUBS

COMMON NAME	SCIENTIFIC NAME	PLANT RESPONSE TO FIRE	RECOVERY TIME	REMARKS
Catclaw	*Acacia greggii*	Tolerant - vigorous resprouter	10-15 years	
Saskatoon serviceberry	*Amelanchier ainifolia*	Not severely damaged - resprouts	30-50 years	
Utah serviceberry	*Amelanchier utahensis*	Slightly damaged - resprouts	30-50 years	Highly adapted to fire; soil being moist at time of burn important. Usually poor reproduction from seed.
Greenleaf manzanita	*Arctostaphylos patula*	Enhanced - vigorous sprouter from root burls		Highly adapted to fire and can form dense stands following burning - shade intolerant
Low sagebrush	*Artemisia arbuscula*	Readily killed - nonsprouter.	30 years	Not recommended to burn - Most low sagebrush communities do not burn readily
Black sagebrush	*Artemisia nova*	Readily killed - nonsprouter.	30 years	Black sagebrush communities may be used as fuel breaks
Silver sagebrush	*Artemisia cana*	Slightly harmed - sprouts from crown	30 years	
Basin big sagebrush	*Artemisia tridentata ssp. tridentata*	Readily killed - nonsprouter	30 years	Good seed crop before burning speeds recovery. Effective control requires burning before seed-set and periodic re-burning
Wyoming big sagebrush	*Artemisia tridentata ssp. wyomingensis*	Readily killed - nonsprouter	30 years	Good seed crop before burning speeds recovery. Effective control requires burning before seed-set and periodic re-burning
Threetip sagebrush	*Artemisia tripartita*	Harmed with top kill - sprouts from crown	30 years	Weak sprouter
Mountain big sagebrush	*Artemisia vaseyana ssp. vaseyana*	Readily killed - nonsprouter.	30 years	Increases more rapidly than other big sagebrush subspecies. Good seed crop before burning speeds recovery. Effective control requires burning before seed-set and periodic re-burning
Fourwing saltbush	*Atriplex canescens*	Variable tolerance - weak to vigorous sprouter	2-3 years if sprouting occurs	More northerly populations appear to be less tolerant to fire and have weaker resprouting characteristic
Bonneville saltbush Sickle saltbush Trident saltbush	*Atriplex bonnevillensis* *Atriplex falcata* *Atriplex tridentata*	Vigorous root sprouters	2-3 years with sprouting	Excellent recovery following fire-decumbent branches typically produce adventitious roots where they contact the soil.
Creeping barberry	*Berberis repens*	Moderately tolerant - vigorous sprouter		May be favored by intense fires

TABLE I. Expected Effects of Fire on Plant Species (continued)

SHRUBS (continued)

COMMON NAME	SCIENTIFIC NAME	PLANT RESPONSE TO FIRE	RECOVERY TIME	REMARKS
Desert ceanothus and other non-sprouting *Ceanothus spp*.	*Ceanothus greggii*	Variable; Nonsprouter - considered to be damaged by spring burning.		Reproduction solely by seed. Seed germination aided with late summer or fall burning
Snowbrush ceanothus and other crown-sprouting *Ceanothus spp*.	*Ceanothus velutinus*	Enhanced - vigorous sprouter Unharmed to enhanced - vigorous sprouters	Rapid	Sprouting aided with late summer or fall burning
Littleleaf mountainmahogany	*Cercocarpus intricatus*	Moderately damaged - very little sprouting		Occurs on harsh sites - rarely burned
Curlleaf mountainmahogany	*Cercocarpus ledifolius*	Moderately to Severely damaged - very little sprouting		Not fire tolerant
Birchleaf mountainmahogany	*Cercocarpus montanus*	Slightly damaged - vigorous sprouter from root crown	Rapid (10 years)	Important plant of chaparral communities that are adapted to recurrent fire
Douglas rabbitbrush	*Chrysothamnus vicidiflorus*	Enhanced - vigorous sprouter Growth of seedlings is rapid	20-25 years	Production reduced for 1 to 3 years following burn then dramatic increase. Severely harmed if burned in early summer. All varieties and subspecies resprout vigorously and reseed well on disturbed sites.
Blackbrush	*Coleogyne ramosissima*	Severely damaged - nonsprouter	>28 years	Intolerant of fire - seedlings reestablish on burned areas very slowly
Barrel cactus	*Echinocactus spp.*	Not tolerant	>15 years	
Nevada ephedra Green ephedra	*Ephedra nevadenis* *Ephedra viridis*	Tolerant - nonsprouter		Generally increases following fire
Rubber rabbitbrush	*Ericameria nauseosa*	Variable response - sprouter	20-25 years	Fall burning has been effective. Intensity of fire important as plants sprout from stems(epicormic), not basal or root sprouters. More readilly controlled if mechanically cut and then burned
Apache plume	*Fallugia paradoxal*	Slightly damaged - vigorous sprouter		Resprouts vigorously - highly fire tolerant
Yellowleaf silktassel	*Garrya flavescens*	Slightly damaged - vigorous sprouter from root crown	Rapid (10 years)	Important plant of chaparral communities that are adapted to recurrent fire
Spiny hopsage	*Grayia spinosa*	Tolerant - resprouts following fire		Often survives burns which kill Wyoming sagebrush - increases in density following summer or fall burning

TABLE I. Expected Effects of Fire on Plant Species (continued)

SHRUBS (continued)

COMMON NAME	SCIENTIFIC NAME	PLANT RESPONSE TO FIRE	RECOVERY TIME	REMARKS
Broom snakeweed	*Gutierrezia sarothrae*	Severely harmed - weak sprouter	20-25 years	New plants invade open areas quickly
Oceanspray	*Holodiscus spp.*	Enhanced - sprouter	20-30 years	Vegetative reproduction following burning is primary method of propagation.
Winterfat	*Krascheninnikovia lanata*	Tolerant	2-3 years	Apparently variable response to burning - considered both a nonsprouter to a vigorous resprouter
Creosotebush	*Larrea tridentata*	Severely damaged by hot fires (June) - weak sprouter		Resprouting common when burned in months other than June
Pricklygilia	*Letodactylon pungens*	Moderately to Severely damaged - very little sprouting		
Engelman pricklypear	*Opuntia engelmanii*	Moderately tolerant	15 years	
Ninebark	*Physocarpus spp.*	Enhanced - sprouter	20-30 years	Highly adapted to fire
Western honey mesquite	*Prosopis glandulosa torreyana*	Tolerant - vigorous sprouter	20-30 years	Young plants easily killed. Burning more effective on upland sites than on bottomlands
Anderson peachbrush	*Prunus andersonii*	Enhanced -vigorous sprouter		Highly adapted to fire
Bittercherry	*Prunus emarginata*	Sprouter	30-40 years	
Black chokecherry	*Prunus virginiana melanocarpa*	Harmed with top kill - vigorous sprouts from crown and roots	30-40 years	
Desert bitterbrush	*Purshia glandulosa*	Slight damage to unharmed - vigorous sprouter	10 years if sprouting occurs	Resprouts vigorously and abundantly even without postfire rains
Stansbury cliffrose	*Purshia stansburiana*	Usually killed by fire - sprouter	30-40 years	Spring burns enghance sprouting, fall burns are best for reproduction from seed; burn when soil is moist
Antelope bitterbrush upright or growth form - (columnar ecotype)	*Purshia tridentata*	Severe mortality with high intensity mid-summer wildfire - weak sprouter. Fire harms columnar form more than it does decumbent form	30-40 years w/o sprouting	Cool fall burns are best for reproduction from seed - burn when soil is wet following fall rain
Antelope bitterbrush decumbent growth form	*Purshia tridentata*	Severe mortality with high intensity mid-summer wildfire - resprouter. Fire harms columnar form more than it does decumbent form	30-40 years w/o sprouting 10 years if sprouting occurs	Fall burns are more damaging than spring burns. Low mortality and high resprouting with cool spring burns - resprouting and layering following cool fall burns if soil is moist at burning or with postfire rains

TABLE I. Expected Effects of Fire on Plant Species (continued)

SHRUBS (continued)

COMMON NAME	SCIENTIFIC NAME	PLANT RESPONSE TO FIRE	RECOVERY TIME	REMARKS
Gambel oak	*Quercus gambelii*	Enhanced - vigorous sprouter	30-40 years	Fire stimulates suckering and results in thickening and merging of individual stands into continuous thickets
Turbinella oak	*Quercus turbinellai*	Tolerant - sprouter		
Skunkbush sumac	*Rhus trilobata*	Tolerant - vigorous sprouter		Fire does not favor plant establishment.
Woods rose	*Rosa woodsii*	Enhanced - sprouter	15-30 years	Highly adapted to fire
Black greasewood Bailey greasewood	*Sarcobatus vermiculatus* *S. vermiculatus baileyi*	Easily top killed - resprouts vigorously		
Mountain snowberry	*Symphoricarpos oreophilus*	Slightly harmed - sprouts from root crown. Rapidly increases after burning.	15 years	Enhanced with cool fires - damaged by hot fires
Parish's snowberry	*Symphoricarpos parishii*	Sprouts from root crown. Rapidly increases after burning.	15 years	Enhanced with cool fires - damaged by hot fires
Horsebrush	*Tetradymia spp.*	Enhanced - vigorous sprouter	30-35 years	Poisonous. Can increase fivefold within 12 years
Joshua tree	*Yucca brevifolia*	Tolerant - root sprouts		Hot fires can be damaging
Spanish dagger	*Yucca schidigera*	Tolerant - root sprouts	2-5 years	Hot fires can be damaging

GRASSES AND GRASS-LIKE PLANTS

COMMON NAME	SCIENTIFIC NAME	PLANT RESPONSE TO FIRE	RECOVERY TIME	REMARKS
Columbia needlegrass	*Achnatherum nelsonii*	Moderately damaged	4-8 years	*Stipa spp*. are generally the least fire resistant bunchgrasses. Large plants more susceptible.
Western needlegrass	*Achnatherum occidentalis*	Moderately damaged	3-5 years	*Stipa spp*. are generally the least fire resistant bunchgrasses. Large plants more susceptible.
Indian ricegrass	*Achnatherum hymenoides*	Slightly damaged	2-4 years	Resistant to burning but slow to increase in plant density
Thurber needlegrass	*Achnatherum thurbariana*	Severely damaged	4-8 years	Less damage to plants when soils high in volcanic ash

TABLE I. Expected Effects of Fire on Plant Species (continued)

GRASSES AND GRASS-LIKE PLANTS (continued)

COMMON NAME	SCIENTIFIC NAME	PLANT RESPONSE TO FIRE	RECOVERY TIME	REMARKS
Crested wheatgrass	*Agropyron cristatum*	Tolerant - Slightly to undamaged		Difficult to burn - useful as fuelbreak
Desert wheatgrass	*Agropyron desertorum*	Tolerant - Slightly, to undamaged		Difficult to burn - useful as fuelbreak
Siberian wheatgrass	*Agropyron fragile ssp. sibericum*	Tolerant - Slightly to undamaged		Difficult to burn - useful as fuelbreak
Black grama	*Bouteloua eriopoda*	Not tolerant - seriously damaged and slow to recover	3-8 years	Basal area of black grama reduced 90% by hot fires in June - may require 3-4 years of rest following burning. Stoloniferous
Blue grama	*Bouteloua gracilis*	Slightly damaged		Usually enhanced by fire
Red brome	*Bromus rubens*	Undamaged	1 year	Response variable - reduction in seed numbers, may prevent heavy reestablishment, however, seedling establishment following burning usually greater
Cheatgrass brome	*Bromus tectorum*	Undamaged	1 year	Response variable-reduction in seed numbers, may prevent heavy reestablishment, however, seedling establishment following burning usually greater
Douglas sedge	*Carex douglasii*	Not damaged	1-3 years	
Threadleaf sedge	*Carex filifolia*	Not tolerant - Severely damaged	4-10 years	
Ross sedge	*Carex rossii*	Not damaged	2-4 years	Resistant to fire damage
Bottlebrush squirreltail	*Elymus elymoides*	Slightly damaged	1-2 years	Very fire resistant - generally increases for several years following fire
Thickspike wheatgrass	*Elymus lanceolatus ssp. lanceolatus*	Undamaged	1-2 years	Difficult to burn - useful as fuelbreak
Streambank wheatgrass	*Elymus lanceolatus ssp. lanceolatus*	Tolerant - Slightly, to undamaged.	1-2 years	Difficult to burn - useful as fuelbreak
Slender wheatgrass	*Elymus trachycaulum*	Not tolerant	Slow	Most suceptible to early spring and late summer burns
Tall wheatgrass	*Elytrigia elongata*	Undamaged	1-2 years	
Intermediate wheatgrass	*Elytrigia intermedia*	Undamaged	1-2 years	Difficult to burn - useful as fuelbreak
Pubescent wheatgrass	*Elytrigia intermedia*	Undamaged	1-2 years	Difficult to burn - useful as fuelbreak
Idaho fescue	*Festuca idahoensis*	Literature reviewed inconclusive. Reports lean toward severely damaged		Spring or fall burning with adequate soil moisture appears to damage plants only slightly. Severely damaged by hot summer or fall burns. Less damage to plants when soils high in volcanic ash

TABLE I. Expected Effects of Fire on Plant Species (continued)

GRASSES AND GRASS-LIKE PLANTS (continued)

COMMON NAME	SCIENTIFIC NAME	PLANT RESPONSE TO FIRE	RECOVERY TIME	REMARKS
Needleandthread	*Hesperostipa comata*	Severely damaged	4-8 years	*Stipa spp.* are generally the least fire resistant bunchgrasses. Large plants more susceptible.
Prairie junegrass	*Koeleria macrantha*	Not damaged	1-3 years	Normally increases for several years following fire
Basin wildrye	*Leymus cinereus*	Slightly damaged	1-3 years	Increases in density following late summer or fall burning
Bush muhly	*Muhlenbergia porteri*	Not tolerant		
Mat muhly	*Muhlenbergia richardsonii*	Tolerant - rhizhomatous		Moderate resistance to burning
Bluebunch wheatgrass	*Pseudoroegneria spicatum*	Slightly damaged	1-3 years	Resistant-when burned under optimum conditions
Western wheatgrass	*Pascopyrum spicatum*	Undamaged	1-2 years	Difficult to burn - useful as fuelbreak
Galleta	*Pleuraphis jamesii*	Slightly damaged - rhizomatous	2 years	Tolerant
Big galleta	*Pleuraphis rigida*	Tolerant	3 years	Severely damaged if burned in a dry year - can recover fully with normal rainfall.
Big bluegrass	*Poa ampla*	Slightly damaged	1-3 years	Minimal damage with late summer and fall burns. Large plants more susceptible.
Cusick bluegrass	*Poa cusickii*	Slightly damaged	1-3 years	Minimal damage with late summer and fall burns
Nevada bluegrass	*Poa nevadensis*	Slightly damaged	1-3 years	Minimal damage with late summer and fall burns. Large plants more susceptible.
Kentucky bluegrass	*Poa pratensis*	Tolerant - rhizomatous	1-3 years	Resistant - most damage from hot, spring burns with low soil moisture level
Sandberg bluegrass	*Poa secunda*	Not damaged	1-3 years	Minimal damage with late summer and fall burns
Alkali sacaton	*Sporobolus airoides*	Tolerant	2-4 years	

TABLE I. Expected Effects of Fire on Plant Species (continued)

FORBS

COMMON NAME	SCIENTIFIC NAME	PLANT RESPONSE TO FIRE	REMARKS
Western yarrow	*Achillea millefolium lanulosa*	Slightly damaged to undamaged	
Horsemin giant hyssop	*Agastache urticifolia*	Slightly damaged - vigorous sprouter	
Wild onion	*Alllium spp.*	Slightly damaged to undamaged	
Pigweed	*Amaranthus spp.*	Enhanced	
Ragweed	*Ambrosia spp.*	Enhanced	
Pussy toes	*Antennaria spp.*	Severely damaged.	
Milkvetch	*Astragalus spp.*	Slightly to moderately damaged	
Arrowleaf balsamroot	*Balsamorhyza sagittata*	Undamaged	
Goosefoot	*Chenopodium spp.*	Enhanced	
Bindweed	*Convolvulus spp.*	Enhanced	
Tapertip hawksbeard	*Crepis acuminata*	Moderatly damaged	
Pinnate tansymustard	*Descurainia pinnata*	Slightly damaged	
Mat eriogonum	*Eriogonum caespitosum*	Severly damaged	
Eriogonum	*Eriogonum spp.*	Severely damaged.	
Sticky geranium	*Geranium viscosissimum*	Moderately damaged	
Tailcup lupine	*Lupinus caudatus*	Moderately damaged - resprouter	
Coyote tobacco	*Nicotania attenuata*	Slightly damaged	
Penstemon	*Penstemon spp.*	Moderately damaged	
Longleaf phlox	*Phlox longifolia*	Slightly damaged to undamaged	
Purslane	*Portulacea spp.*	Enhanced	
Russian thistle	*Salsola kali*	Enhanced	
Tumblemustard	*Sisymbrium altissimum*	Undamaged	
Goldenrod	*Solidago spp.*	Enhanced	
Foothill deathcamas	*Zigadenus paniculatus.*	Slightly damaged to undamaged	